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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,934	10/04/2005	Tsumoru Ohata	043888-0403	6449
53080 7590 10/19/2007 MCDERMOTT WILL & EMERY LLP 600 13TH STREET, NW WASHINGTON, DC 20005-3096			EXAMINER LEE, CYNTHIA K	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 10/19/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/551,934

Applicant(s)

OHATA ET AL.

Examiner

Cynthia Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 5, 7, 14, 16, 18, 20-22, 24, 26, 27, 29-32 and 36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 5, 7, 14, 16, 18, 20-22, 24, 26, 27, 29-32 and 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>9/18/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/25/2007 has been entered.

Response to Amendment

This Office Action is responsive to the amendment filed on 8/24/2007. Claims 1, 5, 7, 13, 14, 16, 18, 20-22, 24, 26, 27, 29-32, and 36 are pending. Applicant's arguments have been considered, and are persuasive. Thus, claims 1, 5, 7, 13, 14, 16, 18, 20-22, 24, 26, 27, 29-32, and 36 are rejected for reasons stated herein below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 7, 27, 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626) and Shinohara (US 6447958).

Sato discloses a lithium ion battery [0001] comprising a positive and negative electrode, and a porous film interposed between the two electrodes. The porous film

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comprises a filler [0099] and a polymer binder [0096]. The resin includes a fluorine-based polymer [0096] and a filler includes aluminum oxide [0099] (instant claims 7, 29).

Sato discloses that the filler amount may be in a range of 5 to 100 parts by mass, on the basis of the 100 parts by mass of the polymer [0100]. Sato does not disclose that the resin amount is 1.5 to 8 parts by weight per 100 parts by weight of said filler (claim 1). Shinohara teaches of using ceramic powder and a polymer in separators. The content of the ceramic powder is from 1% to 95% by weight. When the content of the ceramic powder is less than 1% based on the weight of the separator, the effect for promoting ion permeability and battery property may not be sufficient, and then over 95%, the separator may become fragile and handling thereof may become difficult (5:15-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the content of the resin binder and the ceramic filler of Sato for the benefit of controlling the ion permeability as well as the strength of the separator.

Sato does not disclose a binder comprising core-shell type rubber particles having an adhesive surface portion including at least an acrylonitrile, an acrylate, or a methacrylate unit (claims 1, 16, 21). Maeda teaches a binder comprising a core-shell type rubber particles [0028]. The rubber particles include acrylonitrile, acrylate, or a methacrylate [0043, 0044, 0046]. The surface of the particles necessarily is adhesive because it is a binder. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Maeda's binders to Sato's separator ink for the benefit of imparting a well-balanced binding power and binding durability [0009]. Further, it has been held by the court that the selection of a known material based on its

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suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Further, It has been held by the courts that it is *prima facie* obvious to combine two compositions each of what is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose. *In re Kerkhoven* 205 USPQ 1069 (CCPA 1980). See MPEP 2144.06.

Regarding claim 27, the amount of resin binder on one side is necessarily smaller than the second side because the particles are so small that it is not possible to have equal amounts on both sides without a controlled method of applying the separator ink.

Regarding claims 30 and 31, The Examiner notes that Maeda discloses polyacrylonitrile as one of the polymers [0046] and it possesses a melting temperature of 317 C (see attached). The Examiner notes that the decomposition temperature is necessarily higher than the melting temperature.

Regarding claim 32, Sato does not disclose a gradual increase in the binder content from first side to second side. Applicants disclose that gradual increase in the binder concentration gradient is achieved by drying the mixture between 100 C and 180 C (pg 23, 2nd full par.). Sato discloses that the slurry is hardened by heating [0103], but does not disclose the temperature range. Shinohara teaches of drying the coating of the separator slurry at 150 C for 2 hours (14:41). It would have been obvious to one of ordinary skill in the art at the time the invention was made to dry the slurry of Sato at

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150 C for 2 hours, as taught by Shinohara, for the benefit of drying the slurry to form the separator.

Claims 14, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626) and Shinohara (US 6447958) as applied to claims 1 and 27 above, further in view of Murai (US 2002/0048704).

Sato modified by Maeda and Shinohara teaches a porous film, but does not teach a porous film and a separator. However, Murai teaches of a separator made of an electrically insulating material that has sufficient strength, such as porous film, net, and nonwoven fabric. While not limiting, a single layer or multilayer porous film of polyethylene or polypropylene is preferred [0030]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a layer or a plurality of layers of polyethylene or polypropylene to Delnik's porous composite separator layer modified by Maeda and Shinohara for the benefit of increasing the insulation and strength of the separator to avoid short circuiting. It has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Sato modified by Maeda and Shinohara does not teach a wound battery. However, Murai teaches a wound battery (fig. 3 and 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a wound

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battery of Sato modified by Maeda and Shinohara for the benefit of shaping the battery suitable for the intended application and to increase the capacity of the battery within a given volume.

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Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626) and Shinohara (US 6447958) as applied to claim 1 and incorporated herein, further in view of Sheibley (US 4371596).

Sato modified by Maeda and Shinohara does not teach the filler comprising a mixture of a large particle group and a small particle group. Sheibley teaches a separator comprising a filler material with two distinct particle sizes so that the smaller particles fit or pack within the interstices between the larger particles. The pores are created through the highly tortuous pathway of plasticizer between the well-packed filler particles. The pore size depends upon the surface area of the fillers (4:10-20). Sheibley teaches that the particle size groups are 0.01 to 0.02 microns and 0.1 to 0.2 microns (5:55-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sato's filler material with two distinct particle sizes, as taught by Sheibley, for the benefit of better packing the particles as well as to vary the pore size.

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Claims 21, 22, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626) and Shinohara (US 6447958) as applied to claim 1, further in view of Sheibly (US 4371596).

Sato modified by Maeda and Shinohara does not teach an elongating percentage of said porous film is 15% or more (instant claim 21). Sheibley teaches a separator comprising a filler material with two distinct particle sizes so that the smaller particles fit or pack within the interstices between the larger particles. The pores are created through the highly tortuous pathway of plasticizer between the well-packed filler particles. The pore size depends upon the surface area of the fillers (4:10-20). Sheibley teaches that the particle size groups are 0.01 to 0.02 microns and 0.1 to 0.2 microns (5:55-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sato's filler material with two distinct particle sizes, as taught by Sheibley, for the benefit of better packing the particles as well as to vary the pore size.

Regarding claim 21, the Examiner notes that the elongating percentage of the porous film depends on the amount of binder as well as the filler particle size ratio (see [0195] of instant application PG PUB US 2006/0216608). Thus, the combination of Sato modified by Maeda and Sheibly would necessarily have an elongating percentage of said porous film of 15% or more.

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Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626) and Shinohara (US 6447958), further in view of Sheibly (US 4371596) as applied to claim 21, further in view of Murai (US 2002/0048704).

Sato modified by Maeda, Shinohara, and Sheibly teaches a porous film, but does not teach a porous film and a separator. However, Murai teaches of a separator made of an electrically insulating material that has sufficient strength, such as porous film, net, and nonwoven fabric. While not limiting, a single layer or multilayer porous film of polyethylene or polypropylene is preferred [0030]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a layer or a plurality of layers of polyethylene or polypropylene to Delnik's porous composite separator layer modified by Maeda and Sheibly for the benefit of increasing the insulation and strength of the separator to avoid short circuiting. It has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Sato modified by Maeda, Shinohara, and Sheibly does not teach a wound battery. However, Murai teaches a wound battery (fig. 3 and 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a wound battery of Sato modified by Maeda for the benefit of shaping the battery suitable for the intended application and to increase the capacity of the battery in a given volume.

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Claims 16, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626) and Shinohara (US 6447958) as applied to claim 1, further in view of Call (US 2002/0136945).

Sato modified by Maeda and Shinohara does not teach an average pore size of micropores in said porous film is 0.02 to 0.09 um (claim 16). Call teaches a microporous separator having pore size of from about 0.01 to 5 microns [0029]. Microporous battery separators are used to allow electrolytes to cross through the battery separators while preventing any contact between electrodes [0003]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sato modified by Maeda to have the pore size as taught by Call for the benefit of controlling the amount for electrolyte flowing through the separator.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (US 2002/0034685) in view of Maeda (US 2003/0113626), Shinohara (US 6447958), and Call (US 2002/0136945) as applied to claim 16, further in view of Murai (US 2002/0048704).

Sato modified by Maeda, Shinohara, and Call teaches a porous film, but does not teach a porous film and a separator. However, Murai teaches of a separator made of an electrically insulating material that has sufficient strength, such as porous film, net,

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and nonwoven fabric. While not limiting, a single layer or multilayer porous film of polyethylene or polypropylene is preferred [0030]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a layer or a plurality of layers of polyethylene or polypropylene to Sato's porous composite separator layer modified by Maeda and Call for the benefit of increasing the insulation and strength of the separator to avoid short circuiting. It has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Sato modified by Maeda, Shinohara, and Call does not teach a wound battery. However, Murai teaches a wound battery (fig. 3 and 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a wound battery of Sato modified by Maeda, Shinohara, and Call for the benefit of shaping the battery suitable for the intended application and to increase the capacity of the battery in a given volume.

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Response to Arguments

Only the relevant arguments filed on 9/25/2007 will be addressed herein below.

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Applicant asserts unexpected improvement of reliability of the battery by controlling the elongating percentage of the porous film, referring to par. [0016] (pg. 14 of Response).

The Examiner notes that par. [0016] does not disclose an unexpected improvement of the reliability of the battery by controlling the elongating percentage of the porous film. Further, par. [0016] does not support the claimed language of claim 21.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ckl

Cynthia Lee

Patent Examiner


SUSYTSANG-FOSTER
PRIMARY EXAMINER